MODIS Sea Surface Temperature
Current status and plans for Collection VI

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SST 11-12um	TERRA					
Year	day mean	RMS	Count	night mean	RMS	Count
2000	-0.139	0.797	3091	-0.186	0.794	1800
2001	-0.262	1.43	6321	-0.228	0.707	4935
2002	-0.135	0.621	9244	-0.204	0.58	6935
2003	-0.086	0.607	15685	-0.19	0.558	11058
2004	-0.068	0.579	24964	-0.167	0.559	16943
2005	-0.11	0.549	39826	-0.213	0.519	28460
2006	-0.111	0.562	42838	-0.213	0.513	29194
2007	-0.142	0.553	37989	-0.215	0.505	26097
2008 Q1	-0.105	0.538	10690	-0.216	0.457	7762
all years	-0.115	0.62	189648	-0.213	0.537	133184

SST 11-12um	AQUA					
Year	day mean	RMS	Count	night mean	RMS	Count
2001	-	-	-	-	-	-
2002	-0.153	0.538	10293	-0.235	0.499	5906
2003	-0.133	0.577	22988	-0.224	0.508	12977
2004	-0.137	0.562	26415	-0.219	-0.484	15471
2005	-0.152	0.539	40941	-0.235	0.461	25083
2006	-0.146	0.542	43389	-0.215	0.456	27642
2007	-0.159	0.518	47161	-0.242	0.451	28932
2008 Q1	-0.12	0.509	6788	-0.232	0.43	4789
all years	-0.145	0.548	197975	-0.229	0.467	120800

SST4	TERRA			AQUA		
Year	Night mean	RMS	Count	night mean	RMS	Count
2000	-0.161	0.829	1993			
2001	-0.220	0.663	5397	-	-	-
2002	-0.191	0.528	7580	-0.224	0.449	6429
2003	-0.176	0.500	12006	-0.217	0.455	14095
2004	-0.178	0.493	18452	-0.214	0.426	16765
2005	-0.178	0.471	31130	-0.223	0.414	27280
2006	-0.176	0.466	31933	-0.214	0.408	30065
2007	-0.178	0.458	28377	-0.229	0.396	5352
2008 Q1	-0.17	0.406	8359	-0.203	0.365	5116
all years	-0.179	0.488	145227	-0.216	0.423	105102

Annual globally averaged validation statistics for both missions, derived from 1 km satellite-buoy matchups within 30 minutes of overpass, indicate that the MODIS sensors continue to have excellent performance.

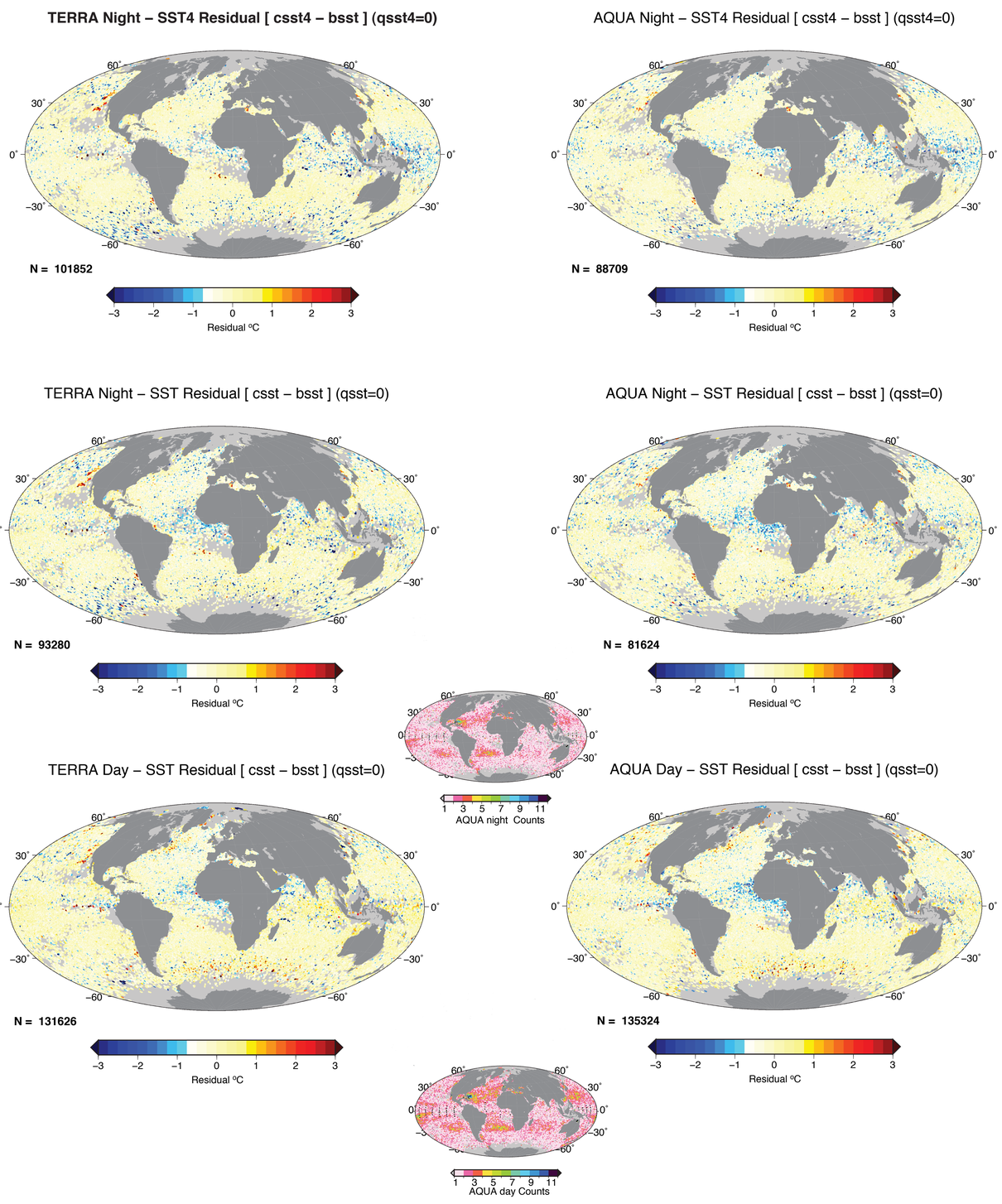
There is no evidence in the annual statistics of a significant degradation of accuracy as the instruments age. The RMS decrease is likely related to the increases in the number of in situ buoys observations and their geographic sampling. Available bouy in situ observations per month peaked in late 2005.

The 11-12um SST product, based on heritage atmospheric correction formulation, and the 4um SST4 based on T4 continue to have the same expected skin bias of ~-0.2 relative to buoys on an aggregate global basis.

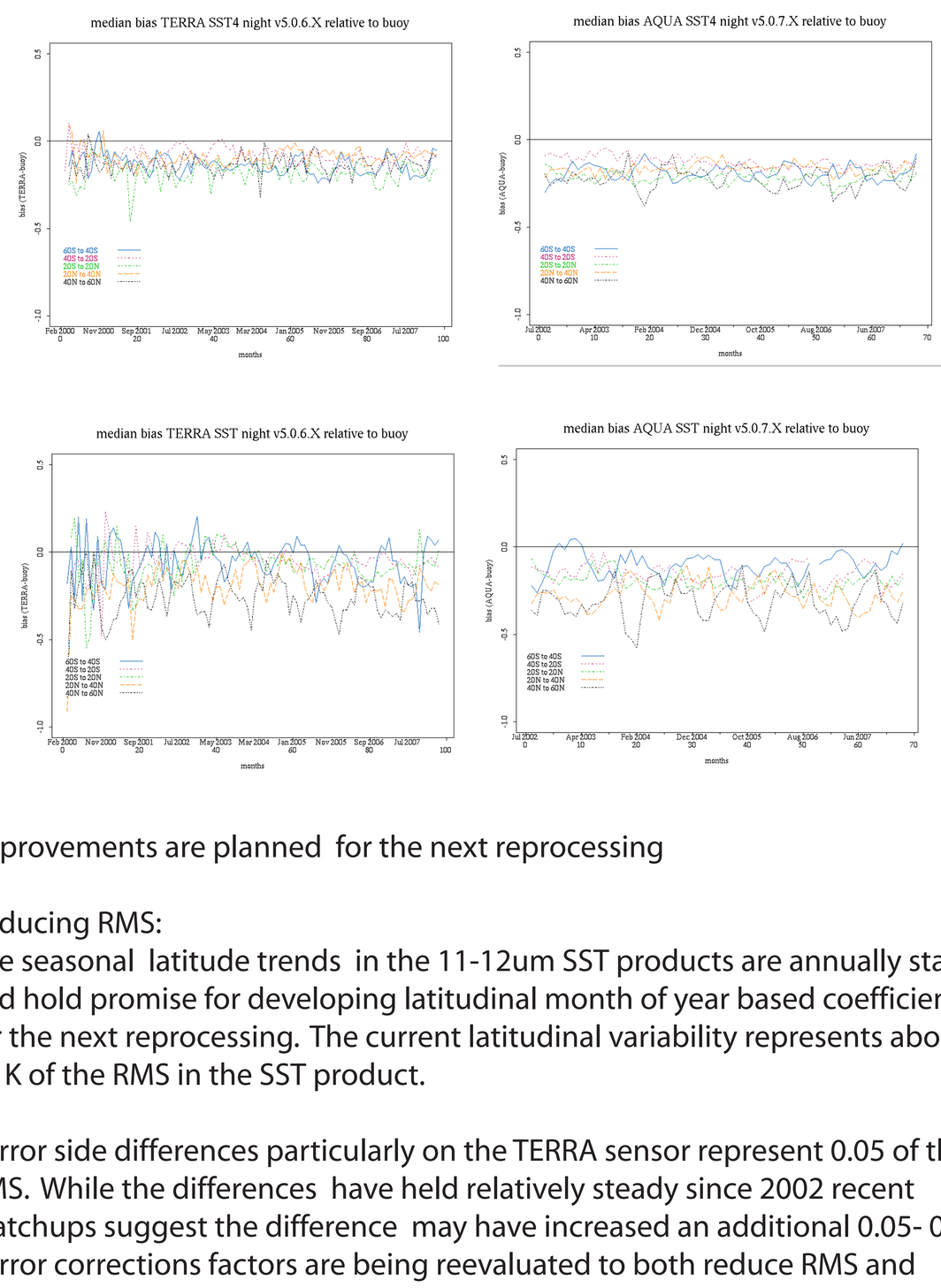
The night time 4um SST4 products, available only on MODIS sensors, demonstrates superior accuracy and precision compared to the 11-12um SST heritage algorithm. The SST4 RMS is approaching 0.35K from the AQUA sensor during the first quarter of 2008 and **Monthly Times Series plots** of the median bias, shown below right, demonstrate the remarkable latitude stability of the 4um product compared to the 11-12um algorithm.

The maps of the global **Mission Mean Bias,** shown below left, indicate that while much of the globe is representative of the aggregate mission mean, persistent bias anomalies do occur in localized geographic regions such as the coast of Northern Africa for the 11-12um SST due to dust and the Tropical Western Pacific Warm pool in the 4um product, likely due to very high atmospheric water vapor loading.

Mission Mean Bias map 0.25x0.25 degree geographic grid



Monthly time series median Bias per latitude band



Each mission has collected over 1 million collocated in situ matchups, with over ~100,000 at the highest quality (ql==0) under clear sky and optimal observing geometries. The **mission mean bias global maps**, shown above, used a nearest neighbor gridding scheme with a cell size of 0.25x0.25 degrees, search radius 0.5 degree, and empty cells set to NaN (not interpolated). The grid value is a weighted mean of the bias with the weighting function computed as function of the distance from the node.

The small pink inset maps shows the counts in each bin that was used in the calculation of the mean, grey areas indicate no matchups available in a grid cell. If the 1km matchups were equally distributed each bin would be expected to have a count of ~3.

Improvements are planned for the next reprocessing

Reducing RMS:
The seasonal latitude trends in the 11-12um SST products are annually stable and hold promise for developing latitudinal month of year based coefficients for the next reprocessing. The current latitudinal variability represents about 0.1K of the RMS in the SST product.

Mirror side differences particularly on the TERRA sensor represent 0.05 of the RMS. While the differences have held relatively steady since 2002 recent matchups suggest the difference may have increased an additional 0.05- 0.1K. Mirror corrections factors are being reevaluated to both reduce RMS and image banding.

Cloud and gradients:
Improving cloud detection and the retention of high gradient regions in level 3 global products is also under development. We are testing the use of the new NCEP 0.25 x0.25 degree daily blended OI SST (Reynolds et. al. 2007) as the declouding reference field and 1st guess SST.

Additional modifications to the current uniformity tests using median filters are planned to aid in the retention of front edges currently masked as cloud.